START

0023897

ENGINEERING CHANGE NOTICE

Page 1 of 2

1. ECN 186768

Proj. ECN

2. ECN Category (mark one)							
Supplemental []	Change ECN []	Supersedure []	Cancel/Void []	Direct Revision [X]	Temporary []	Discovery []	

3. Originator's Name, Organization, MSIN, and Telephone No.	4. Date
J. D. Fancher, Environmental Field Services, N3-05, 6-2081	August 21, 1992

5. Project Title/No./Work Order No.	6. Bldg./Sys./Fac. No.	7. Impact Level
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8. Document Number Affected (include rev. and sheet no.)	9. Related ECN No(s).	10. Related PO No.
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11a. Modification Work	11b. Work Package Doc. No.	11c. Complete Installation Work	11d. Complete Restoration (Temp. ECN only)
[] Yes (fill out Blk. 11b) [X] No (NA Blks. 11b, 11c, 11d)	N/A	N/A Cog. Engineer Signature & Date	N/A Cog. Engineer Signature & Date

12. Description of Change

This is a page change revision, revised document in response to audit.

13a. Justification (mark one)							
Criteria Change []	Environmental []	Facilitate Const. []	Design Error/Omission []	Design Improvement []	As-Found [X]	Const. Error/Omission []	

13b. Justification Details

Response to Environmental Quality Assurance surveillance E92-134 and internal surveillance EFS-92-085.

14. Distribution (include name, MSIN, and no. of copies)

R. T. Coffman	N3-05	R. W. Perusse	H4-16
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J. W. Green	H4-55 (5)	B. G. Tuttle	N3-06
D. O. Hess	L6-57	J. Vaughn	N3-06
M. C. Hagood	H4-55	EDMC (2)	H4-22
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		IRA clearance	H4-17

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Engineering Change Notice

A-7900-013-1 (11/88)

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ENGINEERING CHANGE NOTICE

1. ECN (use no. from pg. 1) 186768

15. Design Verification Required	16. Cost Impact				17. Schedule Impact (days)	
	ENGINEERING		CONSTRUCTION			
[] Yes	Additional	[] $	Additional	[] $	Improvement	[]
[X] No	Savings	[] $	Savings	[] $	Delay	[]

18. Change Impact Review: Indicate the related documents (other than the engineering documents identified on Side 1) that will be affected by the change described in Block 12. Enter the affected document number in Block 19.

SDD/DD	[]	Seismic/Stress Analysis	[]	Tank Calibration Manual	[]
Functional Design Criteria	[]	Stress/Design Report	[]	Health Physics Procedure	[]
Operating Specification	[]	Interface Control Drawing	[]	Spares Multiple Unit Listing	[]
Criticality Specification	[]	Calibration Procedure	[]	Test Procedures/Specification	[]
Conceptual Design Report	[]	Installation Procedure	[]	Component Index	[]
Equipment Spec.	[]	Maintenance Procedure	[]	ASME Coded Item	[]
Const. Spec.	[]	Engineering Procedure	[]	Human Factor Consideration	[]
Procurement Spec.	[]	Operating Instruction	[]	Computer Software	[]
Vendor Information	[]	Operating Procedure	[]	Electric Circuit Schedule	[]
OM Manual	[]	Operational Safety Requirement	[]	ICRS Procedure	[]
FSAR/SAR	[]	IEFD Drawing	[]	Process Control Manual/Plan	[]
Safety Equipment List	[]	Cell Arrangement Drawing	[]	Process Flow Chart	[]
Radiation Work Permit	[]	Essential Material Specification	[]	Purchase Requisition	[]
Environmental Impact Statement	[]	Fac. Proc. Samp. Schedule	[]		[]
Environmental Report	[]	Inspection Plan	[]		[]
Environmental Permit	[]	Inventory Adjustment Request	[]		[]

19. Other Affected Documents: (NOTE: Documents listed below will not be revised by this ECN.) Signatures below indicate that the signing organization has been notified of other affected documents listed below.

Document Number/Revision	Document Number/Revision	Document Number Revision
N/A		

9212705 0938

20. Approvals

Signature		Date	Signature	Date
OPERATIONS AND ENGINEERING			ARCHITECT-ENGINEER	
Cog./Project Engineer J. W. Green		8/24/92	PE	
Cog./Project Engr. Mgr. M. C. Hagood	M C Hagood	8/24/92	QA	
QA			Safety	
Safety D. O. Hess	Dan Hess 4-1-92 16:57	9/1/92	Design	
Security			Other	
Proj. Prog./Dept. Mgr.				
Def. React. Div.				
Chem. Proc. Div.				
Def. Wst. Mgmt. Div.			DEPARTMENT OF ENERGY	
Adv. React. Dev. Div.				
Proj. Dept.				
Environ. Div.			ADDITIONAL	
IRM Dept.				
Facility Rep. (Ops.)				
Other				

Date Received: 9-1-92

INFORMATION RELEASE REQUEST

Reference: WHC-CM-3-4

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- [ ] Thesis or Dissertation
- [ ] Manual
- [ ] Brochure/Flier
- [ ] Software/Database
- [ ] Controlled Document
- [x] Other ECN 186768

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List attachments.

Date Release Required: 8/28/92

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Unclassified Category: UC-

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Classification/Unclassified Controlled Nuclear Information	[ ]	[x]	
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Author/Requestor (Printed/Signature) Date
J.W. Green J.W. Green for J.W. Green 8/26/92

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Part 1

SUPPORTING DOCUMENT

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3. Number
WHC-SD-EN-TI-010

4. Rev No. 9/30
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5. Key Words
Vapor extraction carbon tetrachloride, volatile organic compounds, radiologically contaminated soils, soil remediation, soil gas, vacuum vapor extraction, HEPA filtration, expedited response action

6. Author
Name: J.W. Green
Signature
Organization/Charge Code 81225/PE4AA

7. Abstract

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9. Impact Level 3S

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RECORD OF REVISION	(1) Document Number WHC-SD-EN-TI-010	Page 1

(2) Title

Design, Operation, and Monitoring of the Vapor Extraction System at the Z-1A Tile Field

CHANGE CONTROL RECORD

(3) Revision	(4) Description of Change - Replace, Add, and Delete Pages	Authorized for Release	
		(5) Cog. Engr.	(6) Cog. Mgr. Date
0	(7) Initial Release, EDT 133115		
0-A	Minor general revisions to reflect conditions that have changed since initiation of operations. Pages 1-2, 2-1, 2-2, 2-3, 2-6, 2-7 thru 2-10, 2-14, 2-17, 2-20, 2-24, 2-25, 2-28 thru 2-31, 2-33, 3-1, 3-3, 3-4, 3-7 thru 3-9, 4-12, 4-17 thru 4-19, A-1, A-6, A-8, A-18, A-19, A-31 thru A-34, B-1 thru B-3, D-1, D-4 & D-5 revised. Incorporate ECN 169781	Original signature on file	Original signature on file 4/21/92
0-B	Revised document to add provisions for extracting from the Z-18 Crib. Pages 1-5, 2-6, 2-9, 2-10, 2-11, 2-12, 2-14, 4-1, 4-12, A-6, E-1, and E-7 revised, and 2-15.1, 4-12.1, and A-6.1 added. Incorporate ECN 169782.	Original signature on file	Original signature on file 4/30/92
0-C RS	Revised document in response to audits. Pages 4-1, 4-3, 4-6, B-1, B-2 revised, and pages 4-8 & 4-9 deleted. Incorporate ECN 186768	V D Fowler 8/24/92	M C Hargrove 8/24/92

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4.0 MONITORING

During the soil vapor extraction, the well field (and environs) and the VES test unit will be monitored primarily to measure the performance of vapor extraction. Evaluation of results will be used to: (1) assist in optimizing the VES design and operations; (2) comply with regulatory and Hanford air and GAC release criteria; and (3) conduct operations and monitoring safely. The monitoring program detailed in this section incorporates areas covering the 216-Z-1A Tile Field, 216-Z-9 Trench, and the 216-Z-18 Crib (Figure 4-1). The monitoring program may be modified throughout operations.

Sampling and analysis will be conducted per the Quality Assurance Project Plan (Appendix B), Project Management Plan (Appendix C), the Health and Safety Plan (Appendix E), the Sampling and Analysis Plan (Appendix F), and the Data Management Plan (Appendix G).

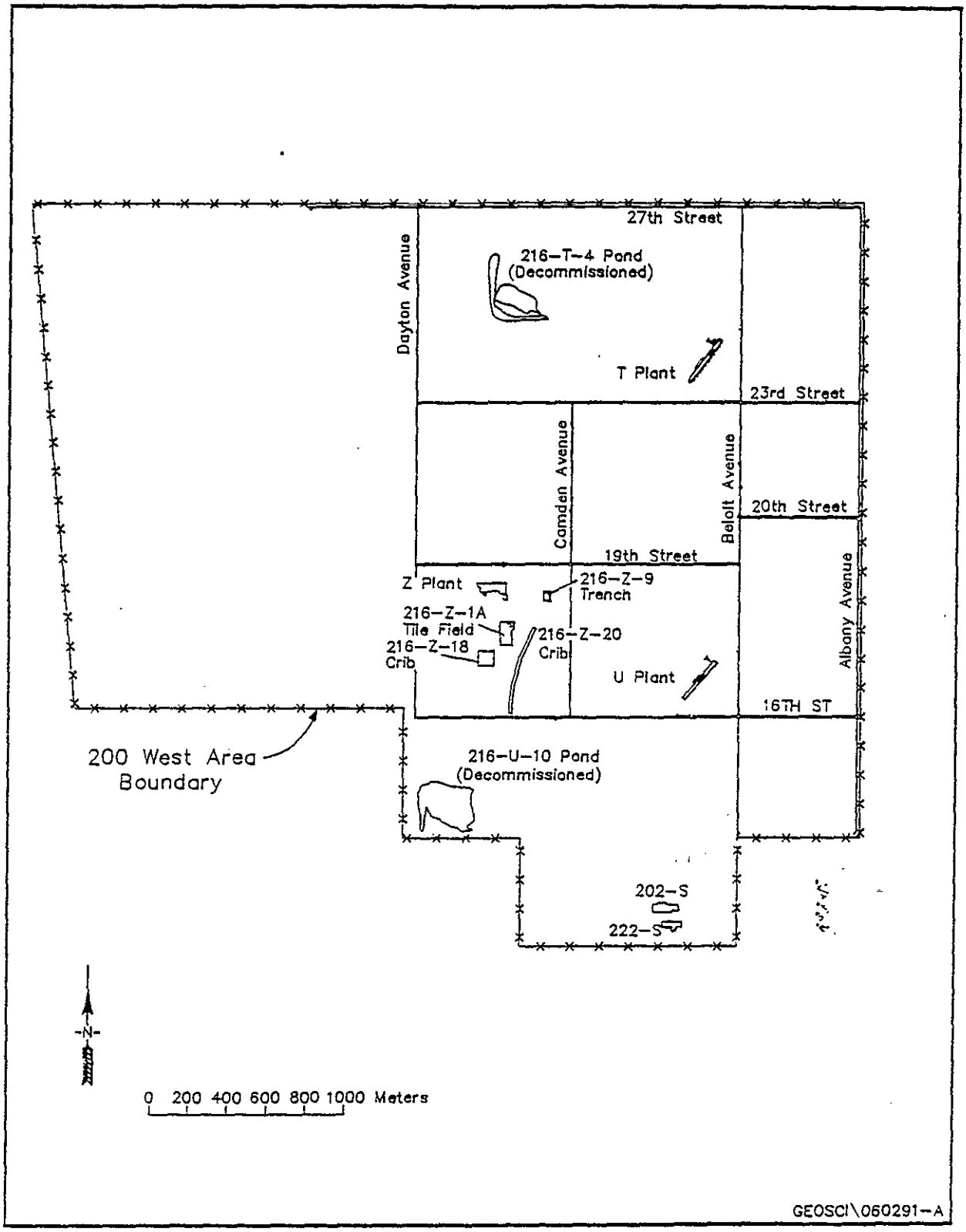
4.1 SUBSURFACE MONITORING

The objectives of subsurface monitoring are as follows:

- Measure the existing concentrations of carbon tetrachloride and other contaminants in the subsurface prior to initiation of the vacuum extraction.
- Investigate how the existing concentrations of carbon tetrachloride and other contaminants vary with time.
- Evaluate the impact of vapor extraction on the distribution and concentrations of carbon tetrachloride and other contaminants in the subsurface.
- Optimize the extraction of carbon tetrachloride vapor from the subsurface.
- Help establish a healthy and safe working environment.

These objectives will be met through two subsurface monitoring programs: baseline monitoring and well field monitoring. Baseline monitoring will include measurement of existing carbon tetrachloride vapor from a variety of depths in the unsaturated zone and measurement of existing carbon tetrachloride and chloroform concentrations in groundwater. These measurements will be repeated at regular intervals to investigate trends in contaminant concentrations. By conducting baseline monitoring before, during, and perhaps after operation of the VES, the data can be used to evaluate the impact of the vacuum extraction on contaminant distributions and concentrations. Data on carbon tetrachloride concentrations are used to address related health and safety concerns.

Figure 4-1. Site Map of 200 West Area.



Well field monitoring will provide data on the distribution of carbon tetrachloride and the permeability of air flow in the vacuum extraction well field. This information will be used to maximize removal of carbon tetrachloride during operation of the VES. It will also be used to recognize and respond to changes in the subsurface environment. The well field components include the vacuum extraction well, monitoring wells, connections, transfer hose, and instruments necessary to link the well field to the rest of the VES.

Radon is a naturally occurring gas present in varying quantities in all soils. At the vapor extraction site, radon in soils occurs in quantities below health and safety concerns. The project scientist may elect to have a limited amount of radon monitoring performed for research purposes in conjunction with baseline monitoring.

The only radon concern is its concentrations in the GAC canisters. This is being addressed in a separate assessment (Millikin 1992).

4.1.1 Baseline Monitoring

Baseline monitoring focuses on measurements of carbon tetrachloride vapor concentrations in the unsaturated zone and of carbon tetrachloride concentrations in groundwater. Sampling points are located in the vicinity of the carbon tetrachloride three disposal facilities (216-Z-1A Tile Field, 216-Z-9 Trench, and 216-Z-18 Crib).

4.1.1.1 Unsaturated Zone. Measurements of soil gas in the unsaturated zone are made at existing wells, at soil-gas sampling points. Prior to initiation of vacuum extraction, these measurements are made twice a week. Once an adequate database has been established, the sampling frequency may be reduced at the direction of the project engineer or project scientist. The monitoring plan outlined in this section is intended to provide general guidance for conducting baseline monitoring in the unsaturated zone. Specific procedures and sampling protocol will be refined as the project evolves.

4.1.1.1.1 Wells. Thirty-three existing wells in the vicinity of the three carbon tetrachloride disposal were selected for baseline monitoring of soil gas (Figure 4-2). Samples will be analyzed at each wellhead. In addition, each well may be sampled downhole. The wells were drilled to a variety of depths (Table 4-1) and completed using a variety of construction techniques (Appendix D.3).

Detection and measurement of carbon tetrachloride at the wellhead is performed using a photoionization detector (PID) type total organic vapor analyzer (OVA) instrument. Because carbon tetrachloride has an ionization energy of 11.25 eV, the PID must be fitted with an 11.8 eV lamp. Baseline monitoring sample locations may be characterized by a number of methods:

Gas chromatograph (GC) analysis of a sample location will sufficiently confirm a location as having carbon tetrachloride present. In this case the sample location will still need PID monitoring twice a week.

Figure 4-2. Locations of Existing Wells Sampled for Baseline Monitoring.

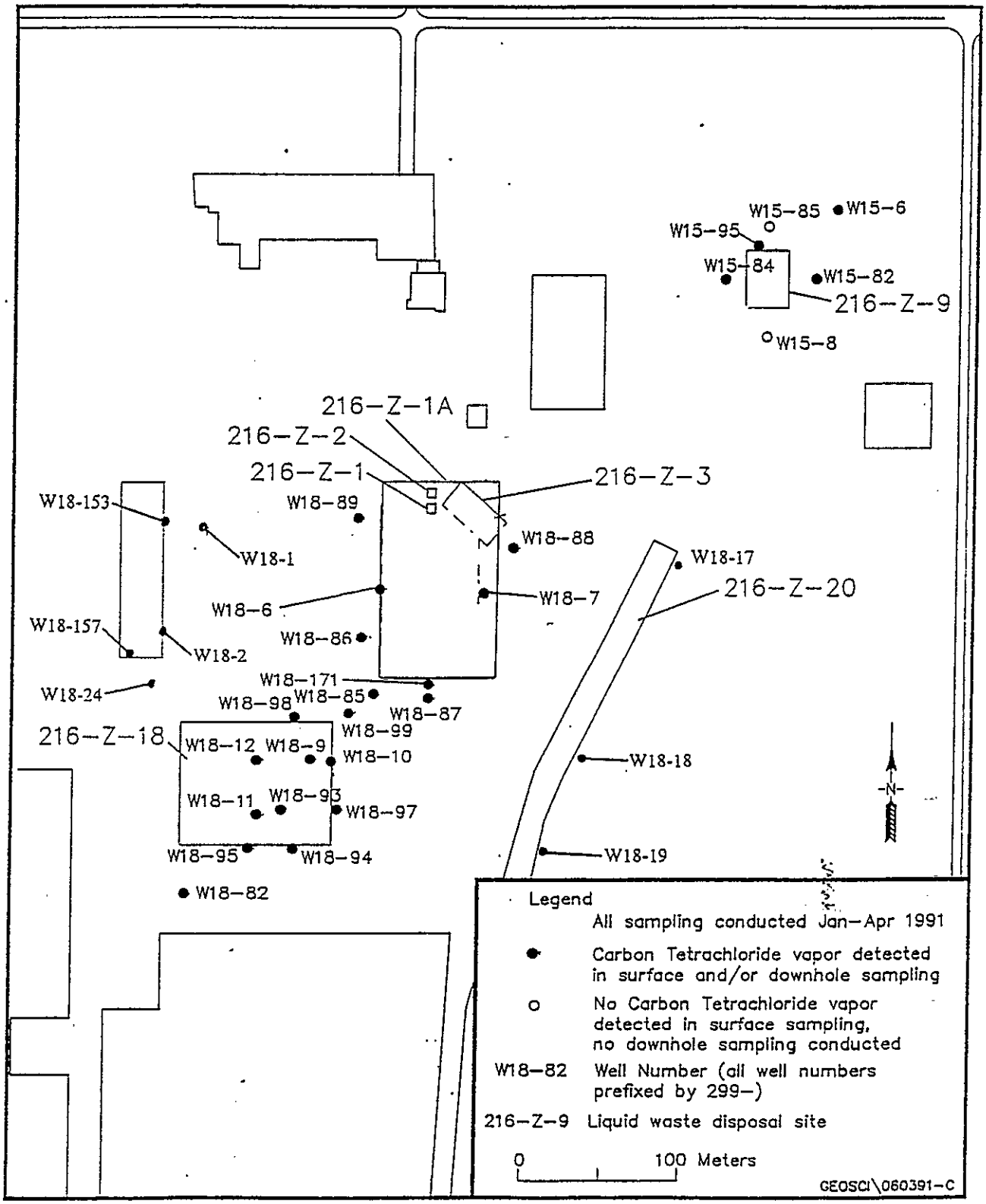


Table 4-1. Construction Details for Existing Wells Sampled for Baseline Monitoring.

Well	Depth to Bottom (ft)	Perforated Interval (ft)	Drill Date	Depth to Water (ft)
W15-6	361	178-408	1959	190
W15-8	202	not documented	1954/1966	197
W15-82	99	none documented	1954	n/a
W15-84	106	"	1954	n/a
W15-85	104	"	1954	n/a
W15-95	99	none documented	1959	n/a
W18-1				
W18-2				
W18-6	201	190-298	1964	n/a
W18-7	203	190-298	1964	n/a
W18-9	218	180-218	1968	211
W18-10	220	180-218	1968	n/d
W18-11	189	180-218	1969	n/a
W18-12	213	190-218	not doc.	n/a
W18-17	218	220-250	1981	201
W18-18	197	183-204	1981	198
W18-19	250	175-205	1982	n/a
W18-24	238	205-235	1987	214
W18-82	148	none documented	not doc.	n/a
W18-85	150	none documented	1969	n/a
W18-86	149	none documented	1969	n/a
W18-87	149	none documented	1969	n/a
W18-88	147	"	1969	n/a
W18-89	142	"	1969	n/a
W18-93	140	"	1972	n/a
W18-94	84	"	1972	n/a
W18-95	78	"	1972	n/a
W18-97	83	"	1972	n/a
W18-98	76	"	1972	n/a
W18-99	131	"	1972	n/a
W18-153	110	"	1976	n/a
W18-157	110	"	1976	n/a
W18-171	129	"	1977	n/a

A chlorinated hydrocarbon monitor may be used during baseline monitoring. Chlorinated hydrocarbon monitors do not distinguish specific chlorinated hydrocarbons (e.g., carbon tetrachloride) but do detect the presence of total chlorinated hydrocarbons. Based on site specific knowledge (gas chromatograph analyses) gained during the ongoing monitoring, the primary detected chlorinated hydrocarbon has been confirmed as carbon tetrachloride. Thus, a positive detection using the chlorinated hydrocarbon monitor will be considered adequate confirmation of the presence of carbon tetrachloride during weekly PID monitoring.

Other baseline monitoring locations (not characterized by GC or chlorinated hydrocarbon monitor) may have the presence of carbon tetrachloride vapor confirmed by use of a colorimetric tube during baseline monitoring at one location that has PID readings two times above background.

Downhole sampling, if performed, may use a teflon (a trademark of E.I. DuPont de Nemours @ Company) tube placed downhole about 6 m (20 ft) to collect the sample. The PID will be attached to the tube and will remove one volume equivalent of air before the instrument reading is recorded.

4.1.1.1.2 Soil-Gas Sampling Points. Twenty-three soil gas sampling points have been installed in the vicinity of the three carbon tetrachloride disposal sites. The 22 sampling points around the 216-Z-18 Crib (Figure 4-3) consist of a small plastic tube rising above the surface and extending down 4 to 5 ft into the subsurface. Samples from 12 of these sampling points will be analyzed to provide data on the near-surface concentrations of carbon tetrachloride in the unsaturated zone. The points initially identified for sampling are: C-1, E-2, E-3, N-2, N-3, N-5, N-6, N-7, N-9, W-1, W-5. However, the specific 12 points sampled may be changed at the direction of the cognizant engineer.

The 23 sampling point (2W-15-06CP) was installed using the cone penetrometer near the 216-Z-9 Trench (Figure 4-3). It consists of a small plastic tube rising above the ground surface and extending 66 ft into the subsurface.

Additional soil-gas sampling points are scheduled to be installed as part of the Phase II Site Evaluation (Rohay 1991). As feasible, new points may be incorporated into the monitoring plan at the direction of the cognizant engineer.

The same measuring instruments used during well sampling and analysis (Section 4.1.1.1.1) are used for soil-gas sampling and analysis. These instruments extract a sample directly from the plastic tube that extends above the ground surface. At least two purge volumes will be extracted at the tubes before a sample is taken. Samples are analyzed for carbon tetrachloride.

4.1.1.1.3 Analysis. All acquired data from the baseline monitoring of the unsaturated zone is recorded by the field technician in a field logbook or stored in the memory of the instrument. A printed copy of the sampling and analysis results from each day of monitoring is given to the project scientist and the cognizant engineer. Calibration of the instruments is done by the sampling technician at the site just before the sampling takes place. The instruments are recalibrated any time readings on the instrument change without apparent reason. Calibration data are entered in the field logbook.

PART 1 - FIELD SAMPLING PLAN

B.1 SAMPLING

Sampling and analysis to support both subsurface and test unit monitoring are described in Sections 4.1 and 4.2, respectively. A summary of the plan (Table B-1) has been compiled from the descriptions of those monitoring tasks. Frequency is relevant to only those periods of time when the vapor extraction system is operating. The frequency of analysis of parameters of the well segments applies only to those times when the well segments are in use.

Table B-1. Field Sampling Plan.

Ident.	Location	Frequency	Purpose	Analyte
W15-6	Z-9	2/week	soil vapor baseline	CCl4
W15-8	Z-9			
W15-82				
W15-84				
W15-85				
W15-95	Z-9			
W18-1	W of Z-1A/Z-18			
W18-2	W of Z-1A/Z-18			
W18-6	Z-1A			
W18-7	Z-1A			
W18-9	Z-18			
W18-10				
W18-11				
W18-12	Z-18			
W18-17	E of Z-1A			
W18-18	SE of Z-1A			
W18-19	SE of Z-1A/Z-18			
W18-24	W of Z-1A/Z-18			
W18-82	Z-18			
W18-85	Z-1A			
W18-86				
W18-87				
W18-88				
W18-89	Z-1A			
W18-93	Z-18			
W18-94				
W18-95				
W18-97				
W18-98				
W18-99	Z-18			

Table B-1. Continued

Ident.	Location	Frequency	Purpose	Analyte
W18-153	W of Z-1A/Z-18			
W18-157	W of Z-1A/Z-18			
W18-171	Z-1A	2/week	soil vapor baseline	CCl4
C-1	Z-18	2/week	soil gas baseline	CCl4
E-2	Z-1A/Z-18			
E-3				
N-2				
N-3				
N-5				
N-6				
N-7				
N-9	Z-1A/Z-18			
W-1	Z-18			
W-5	Z-18			
2W-15-06CP	Z-9			
W7-4	N perim. of plume	2/year	groundwater baseline	CCl4, CHCl3
W7-5	N perim. of plume			
W10-17	N of plume max			
W10-18	N of plume max			
W15-6	Z-9			
W15-8	Z-9			
W15-16	max. of plume			
W15-22	N of plume max			
W18-2	W of Z-18			
W18-9	Z-18			
W18-17	S perim. of plume			
W18-20	S perim. of plume			
W18-29	S perim. of plume			
6-38-70	E perim. of plume			
6-39-79	W of plume max			
6-43-88	W perim. of plume			
6-49-79	N perim. of plume		groundwater baseline	CCl4, CHCl3

7.0 REFERENCES

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PNL, 1989, Procedures for Groundwater Investigations, PNL-MA-567, Pacific Northwest Laboratory, Richland, Washington.

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